

## 1. Demographic Information

### **Background:**

In early 2019 the Ohio Articulation and Transfer Network (OATN) held a discussion with the Ohio Guaranteed Transfer Pathway (OGTP) panel in the discipline area of Biology to explore transfer pathways. During discussion, the OGTP Biology panel recommended the creation of a TAG with a focus on Biology (Genetics). The Ohio Articulation and Transfer Network (OATN) sent out a call for statewide nominations to assist with this work. A Biology (Genetics) TAG writing panel was formulated with content matter experts to meet and discuss TAG learning outcome creation. Initial meetings lead to the dissemination of statewide research to identify department courses, pre-requisites, lab components, and institutional course credit hours.

After some discussion, the writing panel has recommended learning outcomes for the TAG area of Biology (Genetics). The proposed course will not require a laboratory component and ranges in 3-4 credit hours. Key concepts of focus include:

- I. **Nature of Genetic Materials**
- II. **Transmission/Patterns of Inheritance**
- III. **Molecular Biology of Gene Function**
- IV. **Gene Expression and Regulation**
- V. **Genetic Variation**
- VI. **Evolution and Population Genetics**
- VII. **Comparative Genetics/Methods and Tools**
- VIII. **Genetics and Bioethics**

### **What we need from you:**

Please arrange to have the appropriate faculty at your institution complete the survey as soon as possible **but no later than Monday, November 30, 2020**. We are collecting only one representative response per institution.

Thank you in advance for your assistance. If you have any questions, contact Jessi Spencer, Director for Policy, Budget, and Constituent Relations, at 614-728-4706 or [jspencer@highered.ohio.gov](mailto:jspencer@highered.ohio.gov) or Candice Grant, Director for Ohio Guaranteed Transfer Pathways, at 614-466-4136 or [cgrant@highered.ohio.gov](mailto:cgrant@highered.ohio.gov).

### **\* 1. Demographic Information about the Person Completing this Survey**

Name	<input type="text"/>
Institution	<input type="text"/>
Department	<input type="text"/>
Title	<input type="text"/>
Email	<input type="text"/>
Phone	<input type="text"/>

### **\* 2. Please Indicate the Type of Institution that you represent**

- ☐ Two-Year Institution
- ☐ Four-Year Institution

## 2. BIOLOGY (GENETICS)

1. Do you agree with the proposed credit hour range?

Yes, I agree

No, I do not agree

3-4 semester hours

☐☐

2. Do you agree with the proposed pre-requisite?

Yes, I agree

No, I do not agree

OSC003 (Biology I) or  
Equivalent

☐☐

\* 3. **NATURE OF GENETIC MATERIALS:** *What are the nature, structure and function of genetic components found in different biological systems.*

Do you agree with Learning Outcome #1?

Yes, should be essential

Yes, should be non-essential

No

1. Compare the molecular nature and structure of genetic materials found in prokaryotic and eukaryotic cells as well as bacterial, animal and plant viruses. \*  
(Essential)

☐☐☐

\* 4. **NATURE OF GENETIC MATERIALS:** *What are the nature, structure and function of genetic components found in different biological systems.*

Do you agree with Learning Outcome #2?

Yes, should be essential

Yes, should be non-essential

No

2. Describe the molecular and cellular mechanisms involved in DNA replication. \*  
(Essential)

☐☐☐

\* 5. **NATURE OF GENETIC MATERIALS:** *What are the nature, structure and function of genetic components found in different biological systems.*

Do you agree with Learning Outcome #3?

	Yes, should be essential	Yes, should be non-essential	No
3. Explain genetic repair processes expressed in different biological systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 6. **NATURE OF GENETIC MATERIALS:** *What are the nature, structure and function of genetic components found in different biological systems.*

Do you agree with Learning Outcome #4?

	Yes, should be essential	Yes, should be non-essential	No
4. Summarize the relationships between genome replication and different states of the cell cycle in prokaryotes and eukaryotes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. **TRANSMISSION/PATTERNS OF INHERITANCE:** *What are the mechanisms by which an organism's genome is passed on to the next generation.*

Do you agree with Learning Outcome #1?

	Yes, should be essential	Yes, should be non-essential	No
Describe the mechanism by which prokaryote and eukaryote genomes are transmitted to the next generation. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. **TRANSMISSION/PATTERNS OF INHERITANCE:** *What are the mechanisms by which an organism's genome is passed on to the next generation.*

Do you agree with Learning Outcome #2?

	Yes, should be essential	Yes, should be non-essential	No
Recall the stages of meiosis and indicate what is happening during each stage. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. **TRANSMISSION/PATTERNS OF INHERITANCE:** *What are the mechanisms by which an organism's genome is passed on to the next generation.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Describe organelle genetics. *(Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. **TRANSMISSION/PATTERNS OF INHERITANCE:** *How can one deduce information about genes, alleles, and gen functions from analysis of genetics crosses and patterns of inheritance.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Follow alleles over several generations using Punnett squares and Mendelian terminology. *(Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. **TRANSMISSION/PATTERNS OF INHERITANCE:** *How can one deduce information about genes, alleles, and gen functions from analysis of genetics crosses and patterns of inheritance.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Analyze pedigrees to determine patterns of inheritance, including sex linkage. *(Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. **TRANSMISSION/PATTERNS OF INHERITANCE:** *How does the phenomenon of linkage affect the assortment of alleles during meiosis.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Describe genetic linkage and the role homologous recombination plays in allele transmission. *(Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. **TRANSMISSION/PATTERNS OF INHERITANCE:** *How does the phenomenon of linkage affect the assortment of alleles during meiosis.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Explain the relationship between chromosomes and sex determination. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. **MOLECULAR BIOLOGY OF GENE FUNCTION:** *How is genetic information expressed so it affects an organism's structure and function.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Explain how the genetic code relates transcription to translation. *(Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. **MOLECULAR BIOLOGY OF GENE FUNCTION:** *How is genetic information expressed so it affects an organism's structure and function.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Discuss how various factors might influence the relationship between genotype and phenotype (e.g. incomplete penetrance, variable expressivity, and sex-limited phenotype).* (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. **MOLECULAR BIOLOGY OF GENE FUNCTION:** *How is genetic information expressed so it affects an organism's structure and function.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Explain how abnormalities in gene dosage can affect phenotype.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. **MOLECULAR BIOLOGY OF GENE FUNCTION:** *How is genetic information expressed so it affects an organism's structure and function.*

*Do you agree with Learning Outcome #4?*

	Yes, should be essential	Yes, should be non-essential	No
Describe how changes in the number of triplet repeats can alter gene function and phenotype.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. **GENE EXPRESSION AND REGULATION:** *How can gene activity be altered in the absence of DNA changes.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Discuss the roles of types of RNA other than mRNA in expressing genetic information. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. **GENE EXPRESSION AND REGULATION:** *How can gene activity be altered in the absence of DNA changes.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Describe the similarities and differences in eukaryotic and prokaryotic gene expression. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. **GENE EXPRESSION AND REGULATION:** *How can gene activity be altered in the absence of DNA changes.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Contrast the packaging of DNA into euchromatin versus heterochromatin in the context of histone modification, and DNA modification. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. **GENE EXPRESSION AND REGULATION:** *How can gene activity be altered in the absence of DNA changes.*

*Do you agree with Learning Outcome #4?*

	Yes, should be essential	Yes, should be non-essential	No
Discuss the potential roles of DNA modification, histone modification, and non-coding RNA in epigenetic inheritance, both in somatic and germline. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. **GENE EXPRESSION AND REGULATION:** *How do genes and genomes control changes in an organism's structure and function throughout its life cycle.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Describe how differential histone modification modulates gene activity and is utilized in developmental progression. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. **GENE EXPRESSION AND REGULATION:** *How do genes and genomes control changes in an organism's structure and function throughout its life cycle.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Explain how polarity is established in a developing embryo using gene expression gradients. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. **GENE EXPRESSION AND REGULATION:** *How do genes and genomes control changes in an organism's structure and function throughout its life cycle.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Use a model system to describe investigations of evo-devo.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. **GENE EXPRESSION AND REGULATION:** *How do genes and genomes control changes in an organism's structure and function throughout its life cycle.*

*Do you agree with Learning Outcome #4?*

	Yes, should be essential	Yes, should be non-essential	No
Describe genetic cascades; use the sex-determination cascade to explain how differential gene expression can result in the development of different sexes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. **GENETIC VARIATION:** *Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Describe how mutations affect phenotype. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. **GENETIC VARIATION:** *Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Compare the conditions that result from different types of chromosome variations in humans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. **GENETIC VARIATION:** *Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Explain the role of chromosome variation in plants. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



29. **GENETIC VARIATION:** Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.

Do you agree with Learning Outcome #4?

	Yes, should be essential	Yes, should be non-essential	No
Identify and describe the different types of transposable elements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. **GENETIC VARIATION:** Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.

Do you agree with Learning Outcome #5?

	Yes, should be essential	Yes, should be non-essential	No
Explain the role of transposition on individual organisms and evolution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31. **GENETIC VARIATION:** Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.

Do you agree with Learning Outcome #6?

	Yes, should be essential	Yes, should be non-essential	No
Describe the impact of mutations on different classes of genes and their role in the development of cancer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

32. **GENETIC VARIATION:** Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.

Do you agree with Learning Outcome #7?

	Yes, should be essential	Yes, should be non-essential	No
Describe the impact of epigenetic changes on cancer genetics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. **GENETIC VARIATION:** Describe how different types of mutations may affect gene function and explain the potential impact that mutations may have on the corresponding mRNAs and proteins produced by the cell.

Do you agree with Learning Outcome #8?

	Yes, should be essential	Yes, should be non-essential	No
Describe how genetic material can be transferred among microbial cells.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. **EVOLUTION AND POPULATION GENETICS:** What are the processes that can affect the frequency of genotypes and phenotypes in a population over time.

Do you agree with Learning Outcome #1?

	Yes, should be essential	Yes, should be non-essential	No
Explain the difference between organismal and population genetics. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. **EVOLUTION AND POPULATION GENETICS:** What are the processes that can affect the frequency of genotypes and phenotypes in a population over time.

Do you agree with Learning Outcome #2?

	Yes, should be essential	Yes, should be non-essential	No
Apply Hardy-Weinberg equilibrium to population genetics. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. **EVOLUTION AND POPULATION GENETICS:** What are the processes that can affect the frequency of genotypes and phenotypes in a population over time.

Do you agree with Learning Outcome #3?

	Yes, should be essential	Yes, should be non-essential	No
Describe the influence of population genetics on evolution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

37. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *Making comparisons between organism toward greater understanding of human genetics.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Describe the genetic conditions currently being treated using genetic therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

38. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *Making comparisons between organism toward greater understanding of human genetics.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Explain methods of genetic testing. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

39. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *Making comparisons between organism toward greater understanding of human genetics.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Discuss the characteristics of the model organisms that make them useful for comparison to human genetics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

40. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *What experimental methods are commonly used to analyze gene structure, gene expression, gene function, and genetic variants.*

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Describe techniques used to obtain and analyze genomic and proteomic information. * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

41. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *What experimental methods are commonly used to analyze gene structure, gene expression, gene function, and genetic variants.*

*Do you agree with Learning Outcome #2?*

	Yes, should be essential	Yes, should be non-essential	No
Explain the importance of model organisms to the understanding of human genetics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

42. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *What experimental methods are commonly used to analyze gene structure, gene expression, gene function, and genetic variants.*

*Do you agree with Learning Outcome #3?*

	Yes, should be essential	Yes, should be non-essential	No
Describe methods used for gene editing and gene therapy (e.g. CRISPR).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

43. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *What experimental methods are commonly used to analyze gene structure, gene expression, gene function, and genetic variants.*

*Do you agree with Learning Outcome #4?*

	Yes, should be essential	Yes, should be non-essential	No
Explain the process and use of various experimental methods involving recombinant DNA technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

44. **COMPARATIVE GENETICS/METHODS AND TOOLS:** *What experimental methods are commonly used to analyze gene structure, gene expression, gene function, and genetic variants.*

*Do you agree with Learning Outcome #5?*

	Yes, should be essential	Yes, should be non-essential	No
Describe the use of recombinant DNA technology in biotechnology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

45. **GENETICS AND BIOETHICS**

*Do you agree with Learning Outcome #1?*

	Yes, should be essential	Yes, should be non-essential	No
Identify and critique scientific issues relating to biology ethics in genetics (e.g. genetic testing and gene editing). * (Essential)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

46. Comments:

### 3. Institutional Equivalent Course

1. Please indicate your institutions proposed equivalent course for Biology (Genetics):

#### 4. Ohio Guaranteed Transfer Pathways (OGTP)

\* 1. If you agree with the proposed TAG learning outcomes in Biology (Genetics), do you also agree with incorporating the proposed learning outcomes within the Ohio Guaranteed Transfer Pathway (OGTP) of Biology?

☐ Yes

☐ No

Other (please specify)

5. Survey Completion

**Thank you for completing this survey!**